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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
HANDAL, KAITY V	
ART UNIT	**PAPER NUMBER**
1764	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/600,753	SHAABAN ET AL.	
	Examiner	Art Unit	
	Kaity Handal	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 September 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) *21-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/25/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Claims 21-25 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected invention, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 9/27/2006. In response to applicant's remarks traversing the restriction, examiner respectfully explains that the apparatus as claimed can be used to practice a materially different process, such as one which does not use high temperature adsorption followed by low temperature adsorption to remove hydrogen sulfide.

Therefore the restriction is made final.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 contains the limitation "copper/potassium/vanadium", does the applicant mean that the combustion catalyst is comprised of these elements in the alternative

or as a combination? For examination purposes, the examiner interprets that the catalyst is comprised of these elements in the alternative.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1).

With respect to claim 1, Ireland teaches an fuel processor apparatus comprising: a separation assembly (fig. 1; 11, 12, 34, 36) for converting and separating a sulfur-containing distillate fuel feed (35) into an aliphatics-rich and sulfur-depleted gas stream (37) and an aromatics-rich and sulfur-rich liquid stream (39); and

a reforming assembly (not numbered)/one which receives gas stream (37) and convert the gas to a hydrogen-rich stream.

Ireland fails to teach a desulfurization assembly for receiving the aliphatics-rich and sulfur-depleted gas exiting the separation assembly (11, 12, 34, 36) and for removing hydrogen sulfide therefrom to output desulfurized gas. However, Ireland does teach removing sulfur and pretreating stream (15) prior to catalytic reforming said stream (15) (illustrated) (col. 7, line 75 and col. 8, lines 20-26). Therefore, it would have been obvious to one having ordinary skill in the art to place an additional

desulfurization unit upstream of said reforming assembly in order to remove sulfur from stream (37). Limitations recited in claim 1 are mere duplication of parts: *In re* Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) It has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced). MPEP 2144.06B.

Ireland fails to teach a combustion assembly for receiving said aromatics-rich and sulfur-rich liquid stream exiting the separation assembly and for combusting said liquid stream with air to yield process heat which is used to generate steam in said fuel reformer. Yu teaches an apparatus for hydrogen production comprising a reformer (fig. 1, 2) and a combustor (10) positioned adjacent to said reformer (2) wherein said combustor (flame/catalytic) (10) receives recycled cathode exhaust gas (21), hydrogen (16) and methanol (14)/(and would inherently receive air in the event that combustor (10) is a flame combustor) in order to provide external heat to the endothermic reaction taking place in said reformer (2) (page 2, paragraph [0022], lines 1-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a combustion assembly for receiving said aromatics-rich and sulfur-rich liquid stream exiting the separation assembly and for combusting said liquid stream with air to yield process heat in the apparatus of Ireland, as taught by Yu, in order to provide external heat to the endothermic reaction taking place in said reformer.

5. Claims 2, 5-6, 11, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1), as applied to claim 1 above, and further in view of Olsen.

With respect to claim 2, Ireland as modified discloses all claim limitations as set forth above, Ireland further teaches wherein said separation assembly (11, 12, 34, 36) includes: a fuel vaporizer (12) for generating a vaporized and superheated fuel stream from incoming distillate fuel (16); a catalytic cracking reactor (34) for receiving said fuel stream (18a/33) from said fuel vaporizer (12); and a gas-liquid separator (36) receiving and separating an output from said cracking reactor (34) into a gas stream directed to said desulfurization assembly (as modified/duplicated above) and a condensed liquid stream (41) directed to said catalytic cracking unit (34).

Ireland as modified fails to show wherein condensed liquid stream (41) is directed to said combustion assembly. Olsen teaches that recovering heat from exothermic processes can achieve great economies (Unit Processes and Principles of Chemical Engineering, Chapter I, page 4). It would have been obvious to direct condensed liquid stream (41) to said combustion assembly as evidenced by Olsen.

With respect to claim 5, Ireland as modified discloses all claim limitations as set forth above, but he does not explicitly teach wherein said combustion assembly provides heat to said separation assembly for said vaporization and superheating by said vaporizer and for said catalytic cracking by said cracking reactor. Olsen teaches that recovering heat from exothermic processes can achieve great

economies (Unit Processes and Principles of Chemical Engineering, Chapter I, page 4). It would have been obvious to have said combustion assembly provide heat to said separation assembly for said vaporization and superheating by said vaporizer and for said catalytic cracking by said cracking reactor as evidenced by Olsen.

With respect to claim 6, Ireland as modified teaches wherein said separation assembly (11, 12, 34, 36) further includes: a fractionator (12)/(fractionation is part of distillation in (12)) for receiving the vaporized and superheated fuel stream and separating said fuel stream into a heavy liquid residue stream (20) and a light vapor stream (17), said vapor stream (17) being directed to the cracking reactor (34) (as illustrated).

Ireland does not illustrate where said residue stream (20) joins said condensed liquid stream (41) output by said gas-liquid separator (36) directly, however, Ireland does illustrate where part of stream (41) is joined with stream (27) which is a product of sending stream (20) through a coker (21), therefore, it would have been obvious to recycle stream (41), or part of stream (41), and have it join stream (20).

With respect to claim 11, Ireland as modified discloses all claim limitations as set forth above including a combustion reactor for combusting a mixture of fuel (Yu: Fig. 1, 10), Ireland as modified fails to explicitly show wherein said combustion assembly includes a combustion fuel reservoir coupled to said separation assembly (11, 12, 34, 36) for receiving the condensed liquid stream (41); and an air feed stream to provide heat to said separation (11, 12, 34, 36) assembly for said vaporization and superheating by said vaporizer (12) and for said catalytic cracking by said cracking

reactor (34). However, it would be obvious to one having ordinary skill in the art to connect the combustor to a fuel source/reservoir, and it would have been obvious to make use of fractionator/separator bottoms, such as stream (41), for energy/fuel source purposes and heat other parts of the process.

With respect to claim 13, Ireland as modified discloses all claim limitations as set forth above but fails to explicitly show wherein said combustion assembly further includes a water recovery component coupled to said combustion reactor and fuel cell exhaust for recovering water into a condensed liquid stream that is directed to said steam reforming assembly. However, it would have been obvious to one having ordinary skill in the art to recycle such water stream sources to any part of the process in order to achieve better economies.

6. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1), and further in view of Olsen, as applied to claim 2 above, and further in view of Okada et al. (US 5,124,140).

With respect to claim 7, Ireland as modified discloses all claim limitations as set forth above, but he fails to show wherein said desulfurization assembly includes: a high temperature adsorber for conducting a first stage of hydrogen sulfide adsorption on said gas stream to produce a partially desulfurized gas stream; and a low temperature adsorber for conducting a second stage of hydrogen sulfide adsorption on said partially desulfurized gas stream. Okada teaches steam reforming of hydrocarbons wherein desulfurization assembly upstream of a reformer includes: a

high temperature adsorber (fig. 2) for conducting a first stage of hydrogen sulfide adsorption (in the Adsorption step) (col. 4, lines 42-49) of said gas stream to produce a partially desulfurized gas stream; and a low temperature adsorber (in the High Grade Desulfurization step) (col. 4, lines 27-31) in order to reduce the sulfur content to less that 0.1 ppb (col. 3, lines 21-26) and improve the economy of the steam reforming process (col. 3, lines 1-2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the desulfurization assembly in Ireland as modified include a high temperature adsorber and a low temperature adsorber, as taught by Okada, in order to reduce the sulfur content to less that 0.1 ppb and improve the economy of the steam reforming process.

7. Claim 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1), as applied to claims 1 and 2 above, and further in view of Murphy et al. (US 3,862, 899).

With respect to claim 8, Ireland as modified discloses all claim limitations as set forth above, Ireland further teaches a reformer (one receiving said desulfurized hydrocarbon gas stream (37) from said desulfurizing assembly (as set forth above)), and for generating therefrom a product stream that is rich in hydrogen. Ireland is silent as to the type of reforming reaction taking place within the gas reformer, and therefore fails to show wherein said reforming assembly includes a steam generator.

Murphy et al. teaches an apparatus/process for the production of synthesis gas comprising a separation assembly (fig. 1, 11), a steam reformer (46) receiving steam in line (25) and generating hydrogen (as illustrated), and a desulfurization unit (47) upstream said steam reformer (46), and a steam generator/HOC unit (14) in order to produce large amounts of steam (col. 4, lines 33-36).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a steam generator in the apparatus of Ireland, as taught by Murphy, in order to produce large amounts of steam.

With respect to claim 9, Murphy further teaches wherein said reforming assembly further includes: a hydrogen purifier (48) coupled to said steam reforming reactor (46) for separating said product stream into a hydrogen-rich product stream (as illustrated) and a hydrogen-depleted reject stream (not shown but would be inherently present).

With respect to claim 10, Murphy does not explicitly show wherein said steam reforming assembly further includes a water recovery component coupled to said catalytic steam reforming reactor for recovering excess steam therefrom and directing such excess steam to said steam generator, it would be obvious to one having ordinary skill in the art to recycle excess steam back to the steam generator (14) in order to save energy and optimize the process.

8. Claims 3-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1), as applied to claim 1 above, and further in view of Miller (US 6,464,857 B2).

With respect to claims 3-4, Ireland as modified discloses all claim limitations as set forth above but fails to show wherein said cracking reactor (34) includes a catalyst that provides high activity for cracking the aliphatic content, high activity for conversion of the organosulfur species to hydrogen sulfide, and low selectivity for coke formation and wherein said catalyst includes manganese on alumina with 10-15 weight percent loading.

Miller teaches hydrocarbon conversion processes including catalytic cracking (col. 6, lines 51-59) wherein the catalyst used includes manganese (col. 6, lines 16-20) on alumina (col. 6, lines 33-40) with about 10 weight percent loading ((col. 6, lines 20-24) in order to provide an excellent catalyst (col. 6, lines 16-20).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include catalytic cracking catalyst comprised of manganese on alumina with 10-15 weight percent loading in Ireland's modified apparatus, as taught by Miller, in order to provide an excellent catalyst.

9. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1) and in view of Olsen, as applied to claim 11 above, and further in view of Peck (US 3,671,421).

With respect to claim 12, Ireland as modified discloses all claim limitations as set forth above but fails to show wherein said combustion reactor includes a catalyst of copper/potassium/vanadium on alumina with 2-20 weight percent loading. Peck teaches hydrocarbon oxidization wherein the hydrocarbon is oxidized using a catalyst with air, said catalyst is comprised of potassium sulfate promoted vanadium oxide on alumina in the presence of a copper oxide (col. 3, lines 41-48) with 0.0001-10 weight percent loading (col. 2, lines 5-12) in order to provide an improved process for hydrocracking hydrocarbon whereby higher yields of lower boiling hydrocarbon are obtained (col. 1, lines 36-38)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the combustor of Ireland's modified apparatus an oxidation catalyst which includes copper/potassium/vanadium on alumina with 2-20 weight percent loading, as taught by Peck in order to provide an improved process for hydrocracking hydrocarbon whereby higher yields of lower boiling hydrocarbon are obtained.

10. Claims 14-15 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1) in view of Murphy et al. (US 3,862, 899) and in view of Okada et al. (US 5,124,140).

With respect to claims 14-15, Ireland teaches an fuel processor apparatus comprising: a separation assembly (fig. 1; 11, 12, 34, 36) for converting and separating a sulfur-containing distillate fuel feed (35) into an aliphatics-rich and

sulfur-depleted gas stream (37) and an aromatics-rich and sulfur-rich liquid stream (39); and

a reforming assembly (not numbered)/one which receives gas stream (37) and convert the gas to a hydrogen-rich stream.

Ireland fails to teach a desulfurization assembly for receiving the aliphatics-rich and sulfur-depleted gas exiting the separation assembly (11, 12, 34, 36) and for removing hydrogen sulfide therefrom to output desulfurized gas. However, Ireland does teach removing sulfur and pretreating stream (15) prior to catalytic reforming said stream (15) (illustrated) (col. 7, line 75 and col. 8, lines 20-26). Therefore, it would have been obvious to one having ordinary skill in the art to place an additional desulfurization unit upstream of said reforming assembly in order to remove sulfur from stream (37). Limitations recited in claim 14 are mere duplication of parts: *In re* Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960) It has been held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced). MPEP 2144.06B.

Ireland fails to teach a combustion assembly for receiving said aromatics-rich and sulfur-rich liquid stream exiting the separation assembly and for combusting said liquid stream with air to yield process heat which is used to generate steam in said fuel reformer. Yu teaches an apparatus for hydrogen production comprising a reformer (fig. 1, 2) and a combustor (10) positioned adjacent to said reformer (2) wherein said combustor (flame/catalytic) (10) receives recycled cathode exhaust gas (21), hydrogen (16) and methanol (14)/(and would inherently receive air in the event

that combustor (10) is a flame combustor) in order to provide external heat to the endothermic reaction taking place in said reformer (2) (page 2, paragraph [0022], lines 1-15).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a combustion assembly for receiving said aromatics-rich and sulfur-rich liquid stream exiting the separation assembly and for combusting said liquid stream with air to yield process heat in the apparatus of Ireland, as taught by Yu, in order to provide external heat to the endothermic reaction taking place in said reformer.

Ireland fails to show wherein said desulfurization assembly includes: a high temperature adsorber for conducting a first stage of hydrogen sulfide adsorption on said gas stream to produce a partially desulfurized gas stream; and a low temperature adsorber for conducting a second stage of hydrogen sulfide adsorption on said partially desulfurized gas stream. Okada teaches steam reforming of hydrocarbons wherein desulfurization assembly upstream of a reformer includes: a high temperature adsorber (fig. 2) for conducting a first stage of hydrogen sulfide adsorption (in the Adsorption step) (col. 4, lines 42-49) of said gas stream to produce a partially desulfurized gas stream; and a low temperature adsorber (in the High Grade Desulfurization step) (col. 4, lines 27-31) in order to reduce the sulfur content to less that 0.1 ppb (col. 3, lines 21-26) and improve the economy of the steam reforming process (col. 3, lines 1-2).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the desulfurization assembly in Ireland as modified include a high temperature adsorber and a low temperature adsorber, as taught by Okada, in order to reduce the sulfur content to less that 0.1 ppb and improve the economy of the steam reforming process.

Ireland is silent as to the type of reforming reaction taking place within the gas reformer. Murphy et al. teaches an apparatus/process for the production of synthesis gas comprising a separation assembly (fig. 1, 11), a steam reformer (46) receiving steam in line (25) and generating hydrogen (as illustrated), and a desulfurization unit (47) upstream said steam reformer (46). Murphy teaches integrating steam reforming with catalytic cracking in order to efficiently produce synthesis gas and clean fuels (col. 1, lines 31-36).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a steam reformer in the apparatus of Ireland, as taught by Murphy, in order to efficiently produce synthesis gas and clean fuels.

With respect to claim 14, claim describes operational conditions and do not limit the invented apparatus. While features of an apparatus may be recited either structurally or functionally, claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQZd 1429, 1431-32 (Fed. Cir. 1997)., see also In re Swinehad, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971);< In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "Apparatus claims

cover what a device is, not what a device does." Hewlett-packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). MPEP 2114

With respect to claim 17, Ireland as modified teaches wherein said separation assembly (11, 12, 34, 36) further includes: a fractionator (12)/(fractionation is part of distillation in (12)) for receiving the vaporized and superheated fuel stream and separating said fuel stream into a heavy liquid residue stream (20) and a light vapor stream (17), said vapor stream (17) being directed to the cracking reactor (34) (as illustrated).

Ireland does not illustrate where said residue stream (20) joins said condensed liquid stream (41) output by said gas-liquid separator (36) directly, however, Ireland does illustrate where part of stream (41) is joined with stream (27) which is a product of sending stream (20) through a coker (21), therefore, it would have been obvious to recycle stream (41), or part of stream (41), and have it join stream (20).

With respect to claim 18, Murphy further teaches wherein said reforming assembly further includes: a hydrogen purifier (48) coupled to said steam reforming reactor (46) for separating said product stream into a hydrogen-rich product stream (as illustrated) and a hydrogen-depleted reject stream (not shown but would be inherently present).

11. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1) in view of Murphy et al. (US

3,862, 899) and in view of Okada et al. (US 5,124,140), as applied to claim 14 above, and further in view of Miller (US 6,464,857 B2).

With respect to claim 16, Ireland as modified discloses all claim limitations as set forth above but fails to show wherein said cracking reactor (34) includes a catalyst that provides high activity for cracking the aliphatic content, high activity for conversion of the organosulfur species to hydrogen sulfide, and low selectivity for coke formation and wherein said catalyst includes manganese on alumina with 10-15 weight percent loading.

Miller teaches hydrocarbon conversion processes including catalytic cracking (col. 6, lines 51-59) wherein the catalyst used includes manganese (col. 6, lines 16-20) on alumina (col. 6, lines 33-40) with about 10 weight percent loading ((col. 6, lines 20-24) in order to provide an excellent catalyst (col. 6, lines 16-20).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include catalytic cracking catalyst comprised of manganese on alumina with 10-15 weight percent loading in Ireland's modified apparatus, as taught by Miller, in order to provide an excellent catalyst.

12. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1) in view of Murphy et al. (US 3,862, 899) and in view of Okada et al. (US 5,124,140), as applied to claim 14 above, and further in view of US Salvador et al. (US 6,815,106).

With respect to claim 19, Ireland as modified discloses all claim limitations as set forth above but fails to show wherein each of said steam reforming assembly and said combustion assembly further includes a water recovery component. Salvador teaches a hydrogen production apparatus comprising a steam reformer/fuel processor (Fig. 1, 6) (col. 4, lines 23-33), a combustor (30), a fuel cell (4), and a water recovery component/condenser (36) in order to condense water from the gas streams an direct it to a water collection tank from whence it is distributed to where it is needed (col. 2, lines 19-23).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include a water recovery component in the modified apparatus of Ireland, in order to condense water from the gas streams an direct it to a water collection tank from whence it is distributed to where it is needed.

13. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ireland et al. (US 3,671,419) in view of Yu (US 2002/0122965 A1) in view of Murphy et al. (US 3,862, 899) and in view of Okada et al. (US 5,124,140), as applied to claim 14 above, and further in view of Peck (US 3,671,421).

With respect to claim 20, Ireland as modified discloses all claim limitations as set forth above but fails to show wherein said combustion reactor includes a catalyst of copper/potassium/vanadium on alumina with 2-20 weight percent loading. Peck teaches hydrocarbon oxidization wherein the hydrocarbon is oxidized using a catalyst with air, said catalyst is comprised of potassium sulfate promoted vanadium

oxide on alumina in the presence of a copper oxide (col. 3, lines 41-48) with 0.0001-10 weight percent loading (col. 2, lines 5-12) in order to provide an improved process for hydrocracking hydrocarbon whereby higher yields of lower boiling hydrocarbon are obtained (col. 1, lines 36-38)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include in the combustor of Ireland's modified apparatus an oxidation catalyst which includes copper/potassium/vanadium on alumina with 2-20 weight percent loading, as taught by Peck in order to provide an improved process for hydrocracking hydrocarbon whereby higher yields of lower boiling hydrocarbon are obtained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kaity Handal whose telephone number is (571) 272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KH

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02/07/2007

Glenn Caldarola
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